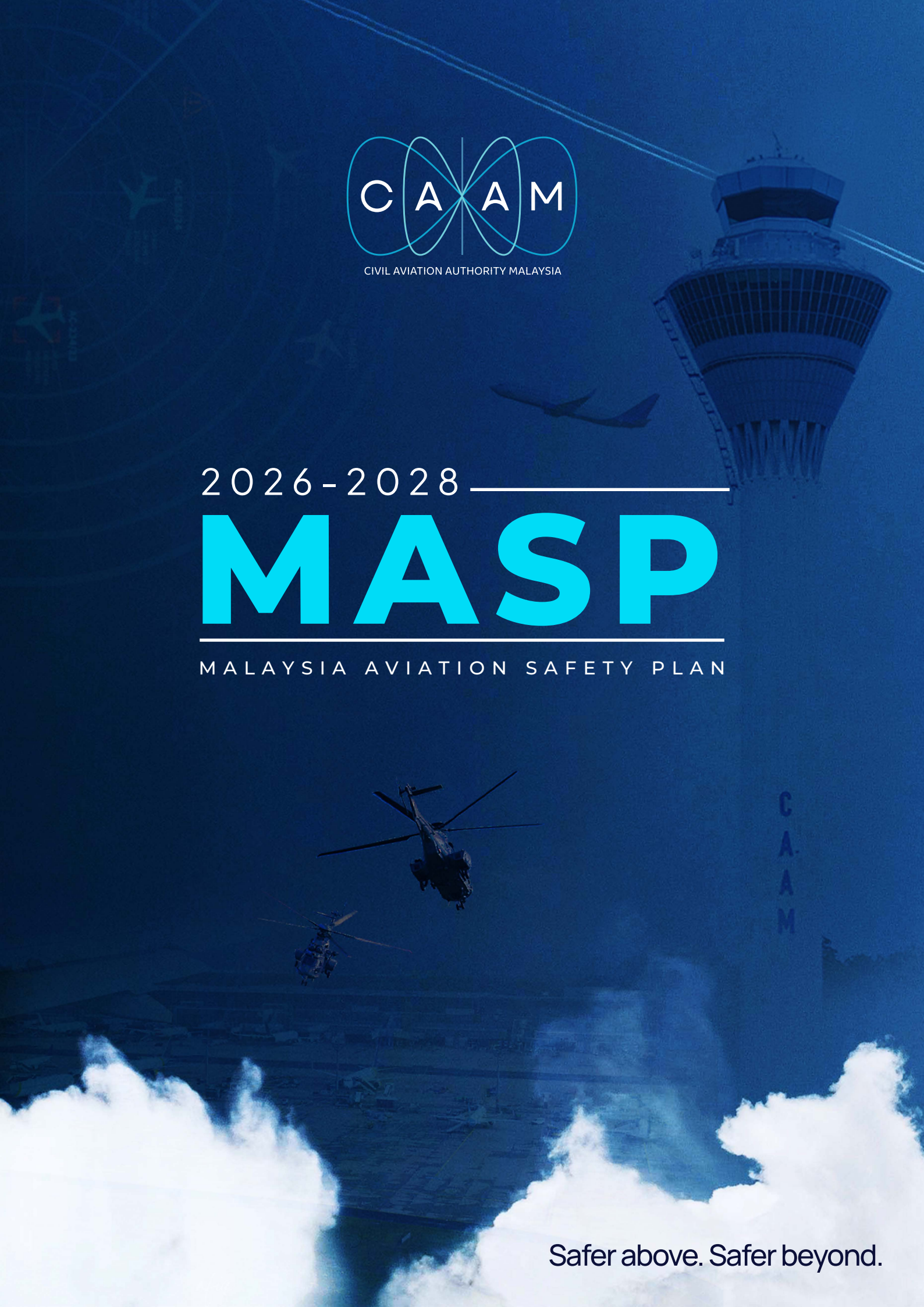
CIVIL AVIATION AUTHORITY MALAYSIA

2026-2028

MASP

MALAYSIA AVIATION SAFETY PLAN



Safer above. Safer beyond.

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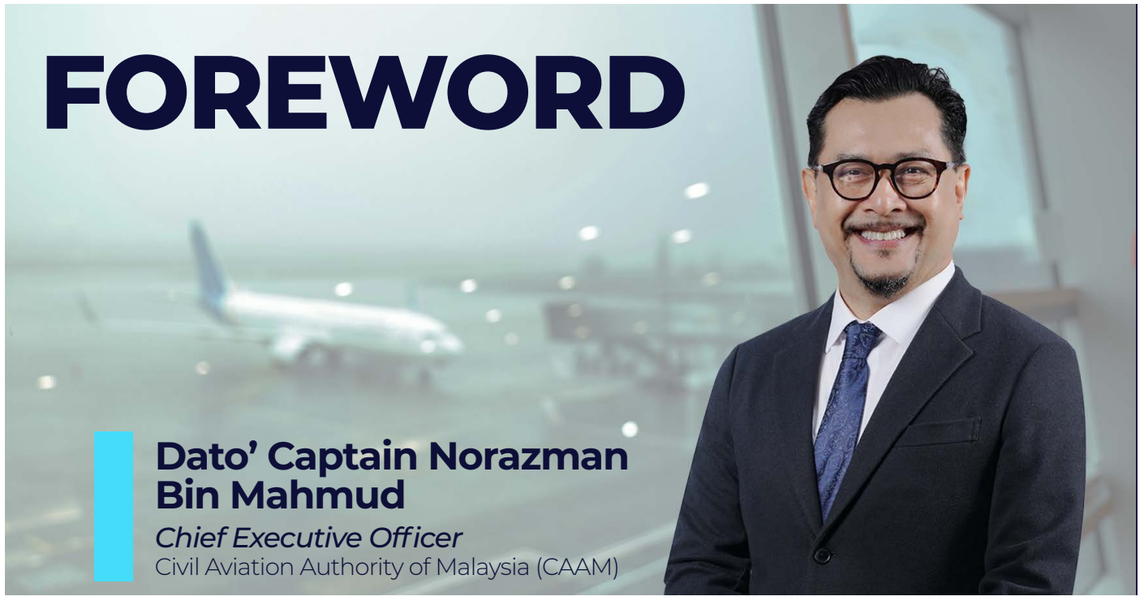


Dato' Captain Norazman Bin Mahmud
Chief Executive Officer
Civil Aviation Authority of Malaysia (CAAM)

Aviation safety remains a top national priority and a shared responsibility for all stakeholders in Malaysia's aviation sector. Over the past three years (2022–2025), Malaysia has made significant strides in strengthening aviation safety and regulatory oversight, even as our airspace becomes increasingly complex and our aviation ecosystem undergoes rapid transformation.

This period has also highlighted areas for continued vigilance. While commercial aviation operations remain largely safe, incidents in general aviation and small aircraft operations underscore the need for proactive risk management and continuous oversight. Airlines have likewise taken deliberate measures to improve operational safety and prevent accidents and serious incidents across Malaysia.

We are now entering an era defined by the rapid advancement of aviation technology — from increasing automation in flight operations, to the integration of artificial intelligence in safety management, to the emergence of the Low Altitude Economy (LAE). Unmanned Aircraft System (UAS) operations, Advanced Air Mobility (AAM), and electric vertical take-off and landing (eVTOL) technologies are no longer distant concepts; they are a near-term operational reality for Malaysian airspace. This MASP formally recognises that trajectory and commits CAAM to building the regulatory and safety oversight frameworks necessary to accommodate these new entrants safely, without compromising the standards that protect the flying public.

The Malaysia Aviation Safety Plan (MASP) 2026–2028 establishes a national safety intelligence and risk management framework, integrating data-driven decision-making, proactive risk identification, and coordinated safety actions across the aviation system. Critically, this edition advances beyond prior editions by explicitly mapping the systemic interactions between national risks, linking all safety actions to measurable performance indicators, and embedding a structured review mechanism to ensure the MASP remains a living instrument of safety governance.

Looking ahead, MASP 2026–2028 will focus on further strengthening safety culture, addressing manpower constraints, and leveraging advanced technologies for proactive risk management — including the responsible integration of LAE operations into Malaysia's national airspace strategy.

This plan reflects Malaysia's commitment to:

- Maintaining the highest level of aviation safety
- Strengthening risk-based oversight
- Enhancing collaboration across all stakeholders
- Aligning with global and regional safety strategies
- Building systemic safety intelligence capability
- Enabling safe and orderly integration of emerging aviation technologies, including LAE

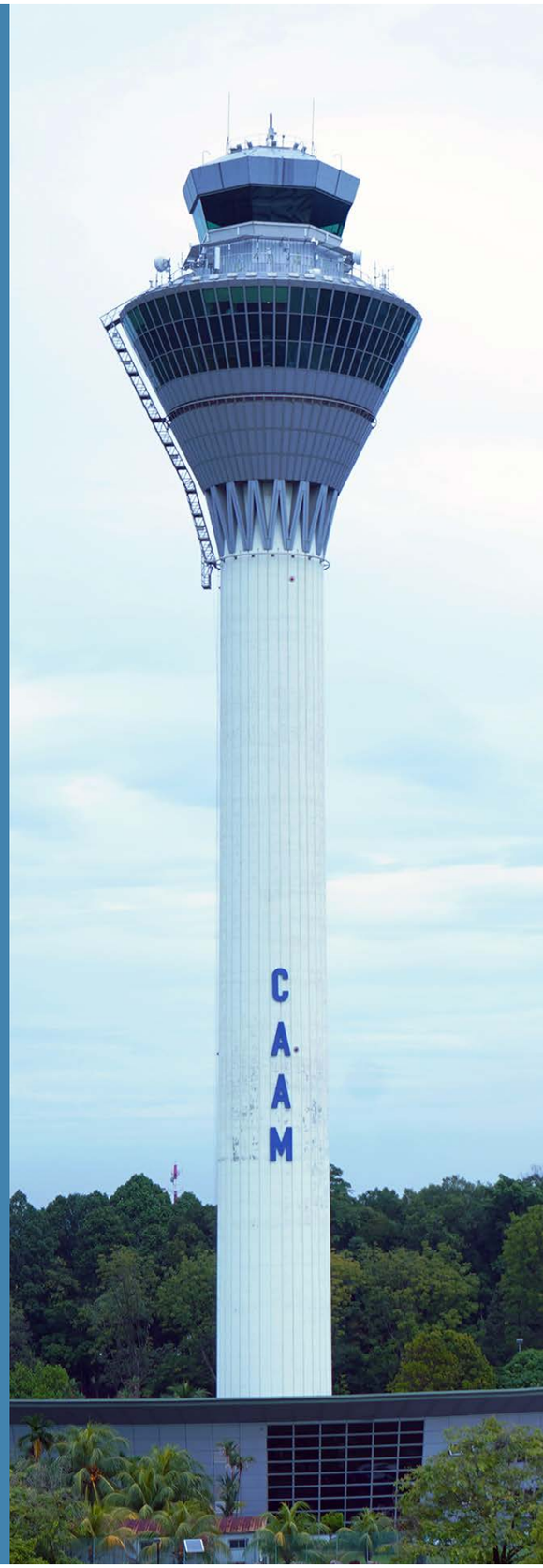
We at CAAM extend our gratitude to all partners — from regulators to operators, from ground staff to aircrew — for their ongoing commitment and collaboration. Through this MASP, Malaysia aims not only to improve safety performance, but to proactively manage and reduce systemic risk at the national level. It is by working together that we can assure aviation safety for the flying public, support sustainable growth, and secure Malaysia's reputation as a safe, reliable, and globally trusted aviation hub.

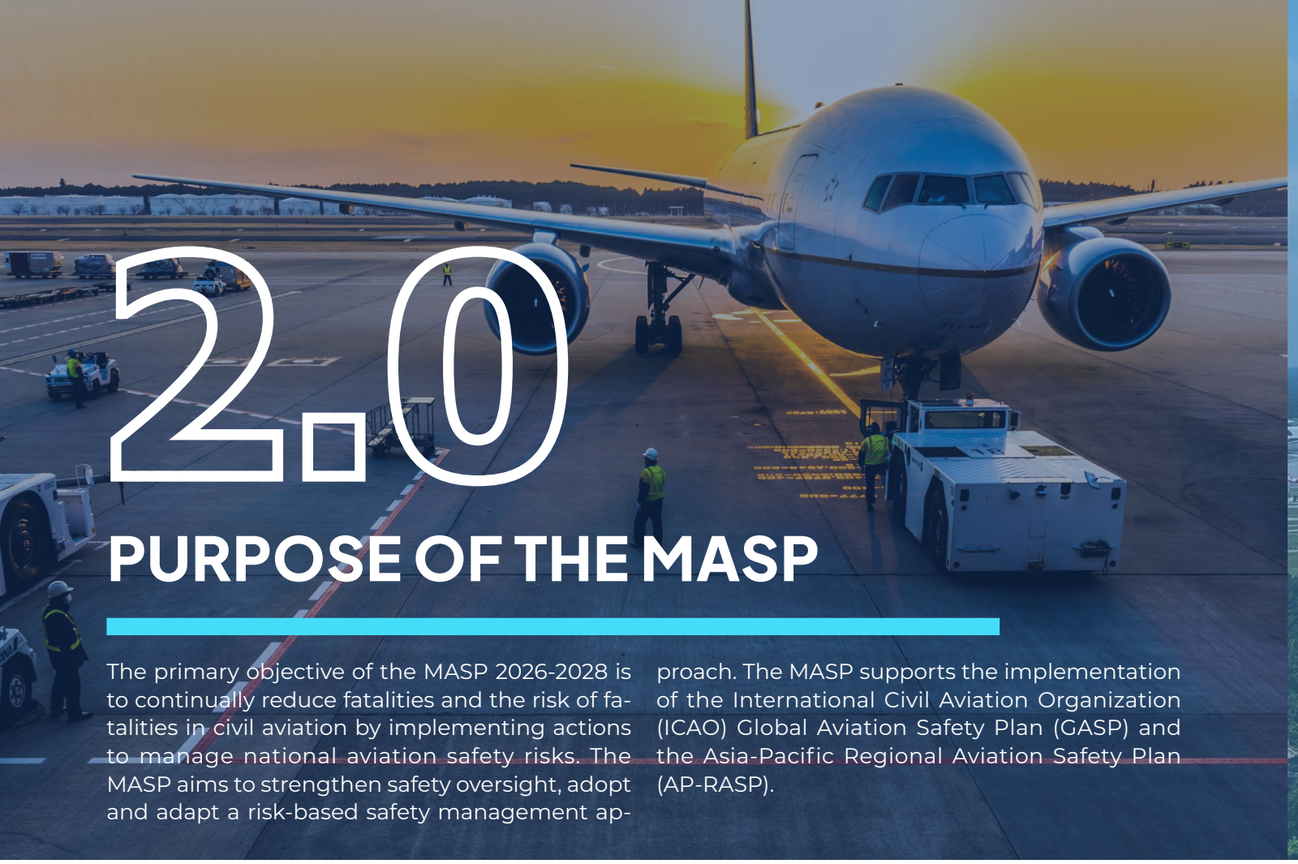
1.0

DEVELOPMENT OF MALAYSIA AVIATION SAFETY PLAN (MASP)

The development of MASP 2026-2028 is an integral part of the State Safety Programme (SSP). The MASP functions as the national strategic document, containing the significant risks and safety issues identified at the national level and the actions required to achieve the State safety objectives.

Malaysia has established a governance structure for its SSP which includes a safety working group, commitments and divisions responsible for the continuous development, review and endorsement of key strategic safety documents. The development of MASP involves participation from the Regulator's divisions and Compliance Division, as well as the main stakeholders and relevant aviation agencies across Malaysia, ensuring a collaborative and comprehensive approach to national aviation safety planning.





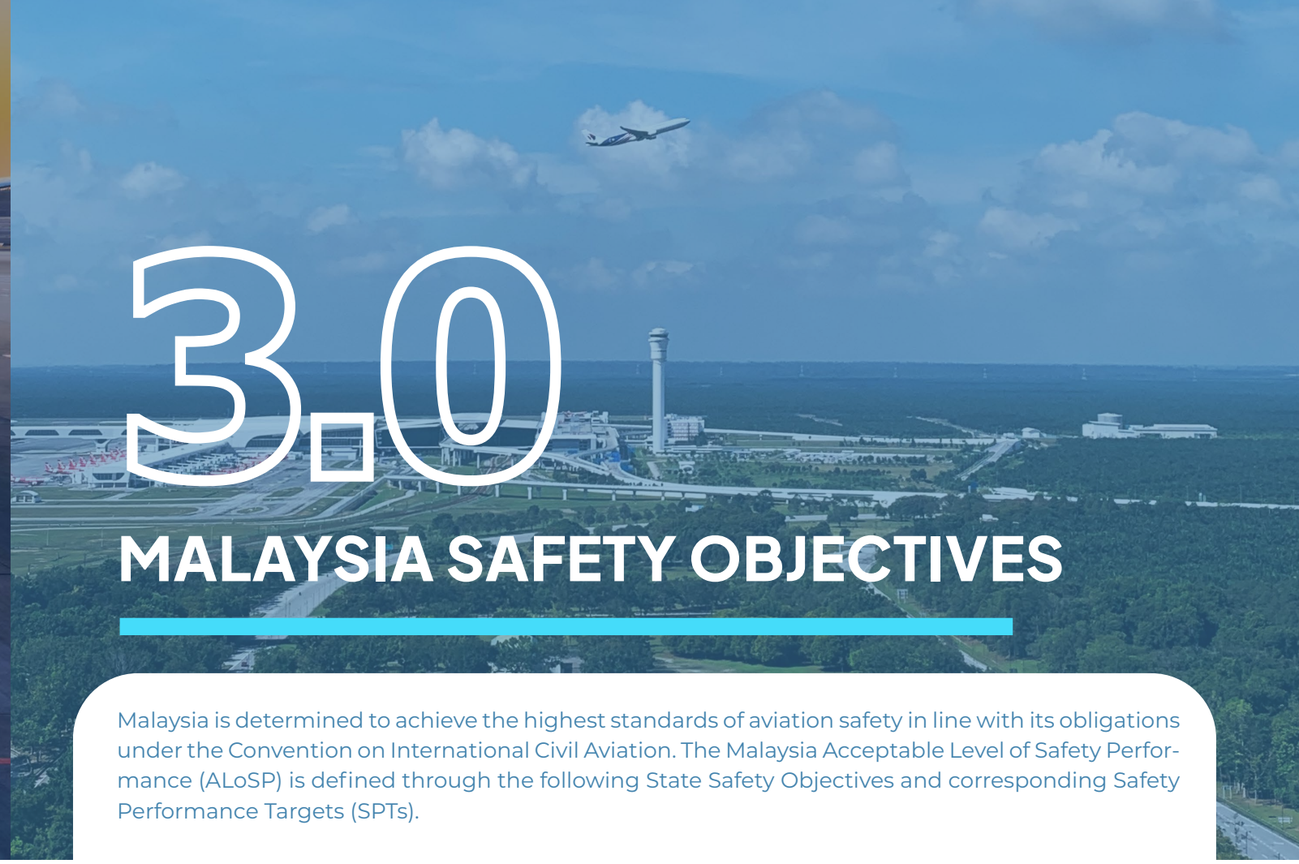
2.0

PURPOSE OF THE MASP

The primary objective of the MASP 2026-2028 is to continually reduce fatalities and the risk of fatalities in civil aviation by implementing actions to manage national aviation safety risks. The MASP aims to strengthen safety oversight, adopt and adapt a risk-based safety management approach. The MASP supports the implementation of the International Civil Aviation Organization (ICAO) Global Aviation Safety Plan (GASP) and the Asia-Pacific Regional Aviation Safety Plan (AP-RASP).

The MASP aims to:

- Strengthen risk-based safety oversight (RBO)
- Enable proactive risk identification through integrated data systems
- Enhance safety performance monitoring and accountability through explicit SPI linkage
- Promote a positive, proactive safety culture grounded in Just Culture principles
- Provide a cross-cutting human factors strategy addressing the systemic driver behind the majority of national safety occurrences



3.0

MALAYSIA SAFETY OBJECTIVES

Malaysia is determined to achieve the highest standards of aviation safety in line with its obligations under the Convention on International Civil Aviation. The Malaysia Acceptable Level of Safety Performance (ALoSP) is defined through the following State Safety Objectives and corresponding Safety Performance Targets (SPTs).

	State Safety Objective	Safety Performance Target
SO-1	Zero fatal accidents in commercial aviation by Malaysian AOC Holders	0 fatal accidents per annum throughout 2026–2028
SO-2	Achieve ICAO Effective Implementation (EI) score ≥90%	EI score ≥90% by December 2028
SO-3	Reduction in serious incidents in commercial operations by Malaysian AOC Holders	15% reduction in serious incidents per 10,000 movements by 2028 vs. 2024 baseline
SO-4	Reduction in runway safety occurrences in Malaysia	30% reduction in runway safety occurrences by 2028 vs. 2024 baseline
SO-5	Increase in proactive and reactive safety reporting across Malaysian aviation organisations	50% increase in MORs and VORs per 10,000 movements by 2028 vs. 2024 baseline
SO-6	Improvement in safety culture through strengthening of Just Culture	≥80% of CAAM Inspectors and Managers trained; ≥60% of Certificate Holders with implemented Just Culture policy by 2028

Note: *For each of the State safety objectives, there are specific State SPIs that are being measured to monitor achievement of the safety objectives. These SPIs are listed in the Appendix B.*

4.0

ALIGNMENT WITH GLOBAL AND REGIONAL SAFETY IMPROVEMENT STRATEGIES

The MASP integrates and adapts the strategies from the GASP 2026-2028 and the AP-RASP, translating global and regional priorities into Malaysia-specific actions. All safety actions within this plan include explicit alignment references to GASP Goals and AP-RASP priorities.

GASP Goal	Description	MASP Alignment
Goal 1	Establish effective safety oversight	SO-2, Risk-Based Oversight (RBO), SSP Maturity Roadmap (Section 8)
Goal 2	Implement SSP and Safety Management System (SMS)	Sections 7, 8, Key Challenges: SSP/SMS Implementation
Goal 3	Address high-risk accident categories	National High Risk Categories (N-HRCs): Runway Excursion (RE), Runway Incursion (RI), Loss of Control In-Flight (LOC-I), Mid Air Collision (MAC), Controlled Flight Into Terrain (CFIT) (Section 9)
Goal 4	Reduce risk of fatalities	SO-1, SO-3, SO-4, Malaysia's Safety Action Plans (Section 10)
Goal 5	Improve safety performance monitoring	Safety Intelligence System (Section 7), Appendix B

5.0

INTEGRATION WITH OTHER NATIONAL PLANS

National Air Navigation Plan (NANP)

The NANP is essential to the MASP framework as it provides the foundational strategy for achieving a safe, efficient air navigation system that reduces complexity, controller workload and support modern air traffic operations within Malaysian airspace. The MASP and NANP share the common goal of reducing operational risks such as Runway Incursions (RIs) or Mid-Air Collisions (MACs) through better use of new technologies and procedures. Joint planning between the safety regulator and ANS teams ensures that resources are allocated effectively and that safety considerations are put into the design phase of new projects.

National Civil Aviation Security Programme (NCASP)

Security measures can have direct safety consequences and vice-versa. For example, a security directive to lock cockpit doors (a security measure) is also a critical measure to protect the flight deck. A security measure implemented without a safety assessment could create a new hazard.

The MASP process ensures these interfaces are identified, assessed, and effectively managed. Both programmes are fundamentally about risk management principles. Strengthening coordination and sharing of threat and risk information between security and safety authorities enables a more comprehensive and holistic understanding of the overall risk landscape facing Malaysian aviation.

6.0 NATIONAL HIGH-RISK CATEGORIES (N-HRCS): FRAMEWORK AND ALIGNMENT

National safety risks are identified from safety intelligence gathered from the following sources:

- Occurrence reporting through Mandatory Occurrence Reporting (MOR) and Voluntary Reporting (VOR) via CAAM Aviation Safety Reporting System (CAReS)
- Surveillance and audit findings
- Flight Data Monitoring (FDM)
- Air Traffic Controller (ATC) operational data
- Industry inputs and regional and international safety intelligence

6.1 State Safety Risk

The State Safety Risks represent Malaysia's priority operational safety concerns, identified through analysis of national safety data, including safety risk assessments, occurrence reports, and surveillance findings. These risks are categorized into Core Operational Risks (global focus), Emerging and Systematic Risks (new priorities), and Technical/Ground Risks (data-driven).

6.1.1 Category A: Core Operational Risks (Global Focus)

Runway Safety (Excursion and Incursion) (RE/RI):
Remains the highest accident risk category globally. Malaysia faces specific risks related to "Wet Runway" operations during monsoon seasons.

Loss of Control In-Flight (LOC-I):
The leading cause of fatalities in commercial aviation. Requires continued focus on flight deck automation failures and flight crew competencies.

Mid-Air Collision (MAC):
There is rising risk due to increasing levels of traffic and increasing complexity of the airspace shared by commercial jets, general aviation, helicopters and drone activity.

6.1.2 Category B: Emerging and Systematic Risks (New Priorities)

Turbulence Encounter (TURB):
MOR data shows a 77.78% increase for 2024-2025 in turbulence reports. Climate change is increasing the frequency of Clear Air Turbulence (CAT) in the region.

Global Navigation Satellite System (GNSS) Radio Frequency Interference (RFI):
Analysis of 2024-2025 MOR data indicates GNSS RFI is the most frequent technical occurrence (48.17% of reports). It threatens the navigation accuracy of Malaysian fleets operating in high-risk global flight corridors.

On Board Fire:
An emerging high-severity risk due to the increasing volume of air cargo and personal electronic devices. Thermal runaway fires pose a catastrophic threat to hull integrity.

Aviation Cybersecurity and Data Integrity:
Cybersecurity is considered an emerging risk due to the reliance of computer and data systems used across the aviation system. Cyber-attacks could compromise safety-critical Air Traffic Management (ATM) systems or flight-data.

6.1.3 Category C: Technical and Ground Risks (Data-Driven)

System/Component Failure (Non-Powerplant) (SCF-NP):
Identified as a new "Global Risk" in GASP 2026. Focuses on technical reliability, supply chain issues, and ageing aircraft maintenance.

Ground Safety and Ramp Operations:
Increases in traffic growth at all airport and other hubs is resulting in an increase in aircraft damage events. The focus is on reducing ground collisions and ramp accidents during taxiing, aircraft towing and aircraft turnarounds.

Note: *Based on current national data analysis (0 accidents, 0 serious incidents in 2023-2024 per Appendix C), Controlled Flight Into Terrain (CFIT) is not currently considered as a National High-Risk Category. However, given its historically catastrophic severity potential and its classification as a Global High-Risk Category (G-HRC), CFIT remains under monitoring within the Malaysia State Safety Programme (MSSP) performance monitoring framework.*

7.0 SAFETY INTELLIGENCE SYSTEM

7.1 CAAM Aviation Reporting System (CAReS) 2.0 Implementation

CAReS 2.0 represents the immediate development priority within CAAM's Safety Intelligence capability. It supersedes the incumbent CAReS platform through the introduction of enhanced data quality controls, multi-agency data input capability, a structured occurrence taxonomy aligned with ICAO Accident/Incident Data Reporting (ADREP) standards, and algorithmically derived Safety Performance Indicators — providing the analytical foundation for the development of safety intelligence in support of CAAM's SSP.

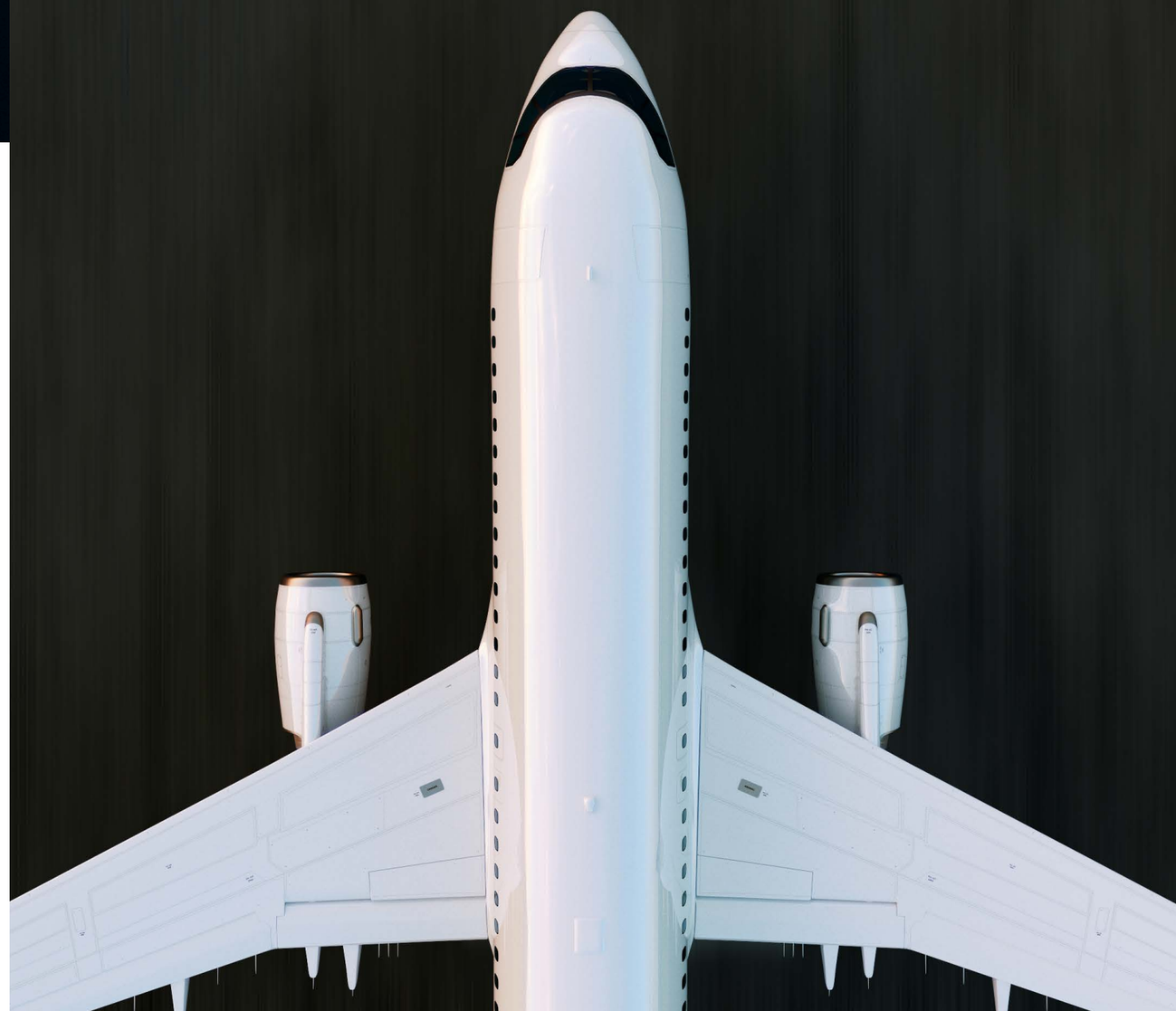
Milestone	Target Date	Lead	Dependency
CAReS 2.0 requirements specification	Q2 2026	CAAM SSP / IT	—
CAReS 2.0 development and testing	Q3 2026	CAAM IT	Requirements sign-off
CAReS 2.0 deployment (CAAM internal)	Q4 2026	CAAM SSP / IT	Testing completion
Stakeholder portal rollout (operators, ANSP)	Q1 2027	CAAM SSP	CAReS 2.0 deployment

8.0 SSP MATURITY ROADMAP

8.1 Current SSP Maturity Baseline

Malaysia's current SSP maturity is assessed at Level 3 (Proactive Implementation) based on the 2025 Integrated Safety Trend Analysis and Reporting System (iSTARS) self-assessment. The MASP 2026–2028 targets achievement of Level 4 (Predictive/Integrated SSP) by December 2028.

Malaysia will enhance its SSP capability through a phased development programme grounded in the ICAO SSP maturity model. The roadmap below establishes specific capability milestones, governance triggers, and resource requirements for each phase.



8.2 Three-Year Capability Development Plan

Year	Phase	Focus Area	Key Milestones	Governance Trigger for Next Phase
2026	Phase 1: Foundation and Data Integration	CAReS 2.0 deployment; data governance framework; SPI baseline establishment; Human Factors training framework launch	CAReS 2.0 live (Q4 2026); SPI baselines published	CAReS 2.0 fully operational with all CAAM divisions reporting
	Phase 1: SSP Unit Staffing	Establish dedicated SSP Unit staffing: minimum eight (8) qualified safety analysts	Minimum of eight (8) qualified safety analysts recruitment and assigned to SSP Unit; roles and responsibilities formalised; competency and training framework established	SSP Unit fully staffed and operational with defined responsibilities and capability to support CAReS 2.0, SPI monitoring and SSP Implementation
2027	Phase 2: Predictive Analytics and Enhanced Oversight	Predictive risk modelling; risk-based oversight (RBO) refinement; international data sharing	Predictive model for risks validated; RBO framework updated; GNSS RFI international data link established	Predictive model validated against 60 months of occurrence data
2028	Phase 3: Fully Integrated SSP	Full SSP integration; automated SPI reporting; EI score ≥90% achievement; MASP 2029–2031 development	EI ≥90% validated by USOAP CMA; automated SPI dashboard live; SO-3, SO-4, SO-5 targets achieved; MASP 2029 initiated (Q3 2028)	USOAP CMA EI score ≥90% validated
	Phase 3: International training and study visits	International SSP training programmes, ICAO and regional safety workshops, study visits to mature SSP States and knowledge-sharing initiatives to enhance SSP capability and safety oversight effectiveness	Participation at least three (3) international SSP training programmes or study visits; completion of benchmarking activities with mature SSP States, lessons learned documented and integrated into SSP Implementation.	International best practices incorporated into CAAM SSP processes and oversight activities with competency enhancement objectives achieved.

9.0

PERFORMANCE MONITORING FRAMEWORK

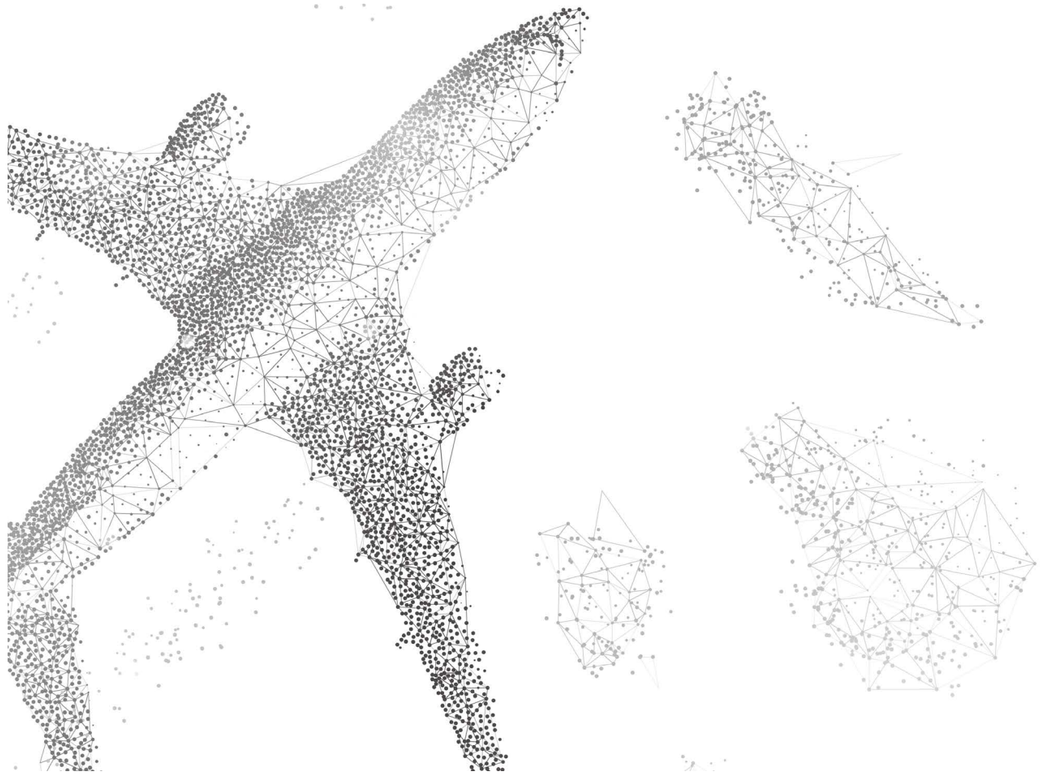
A fundamental enhancement in this edition of the MASP is the explicit linkage between Safety Actions and Safety Performance Indicators (SPIs). Every safety action is traceable to a specific SPI, enabling genuine performance accountability. The framework below provides the master SPI-to-Action linkage matrix.

9.1 SPI-to-Action Linkage Matrix

State Safety Objective	SPI	2024-2025 Baseline	2028 Target
SO-1: Zero fatal accidents	Fatal accidents / 10,000 movements	0 (commercial)	0
SO-2: EI ≥90%	Average EI score (USOAP)	~78% (est.)	≥90%
SO-3: Reduce serious incidents	Serious incidents / 10,000 movements	8 (2024)	≤6 (by 2028)
SO-4: Reduce runway events	Runway incursions / 10,000 movements	0.57 per 10,000 movements (2024-2025)	30% reduction
SO-4: Reduce runway events	Runway excursions / 10,000 movements	0.195 per 10,000 movements (2024-2025)	30% reduction
SO-4: Reduce runway events	Unstabilised approaches continuing to land / 10,000 mvts	Decrease by 100% (2024-2025)	20% reduction
SO-5: Increase safety reporting	MORs / 10,000 movements	45.30% increase (2024-2025) in CAReS	50% increase
SO-5: Increase safety reporting	VORs / 10,000 movements	86.50% increase for 2024-2025 in CAReS	50% increase
SO-6: Safety culture improvement	% orgs with documented Just Culture policy	est. <30%	≥60%
Runway Safety	Runway safety event / 10,000 movements	0.77 per 10,000 movements (2024-2025)	15% reduction
Ground Safety	Ground damage events / 10,000 movements	2024-2025 CAReS baseline	20% reduction
Lithium Battery	DG-related safety reports / 10,000 movements	2024-2025 CAReS baseline	25% reduction
Turbulence	Air turbulence occurrences / 10,000 movements	77.78% increase (2024–2025)	Stabilise at 2024 level

9.2 SPI Review Cycle

Review Frequency	Forum	Participants	Output
Monthly	CAAM SSP Unit internal review	SSP Unit, SPI data owners	SPI dashboard update; anomaly alerts to divisional heads
Quarterly	CAAM Safety Performance Review Meeting	Director of Safety Regulation, divisional heads, Air Accident Investigation Bureau (AAIB) liaison	Quarterly SPI report; oversight resource reallocation if triggered
Annually	Malaysia Safety Coordination Council (MSCC)	CAAM, Ministry of Transport (MOT), AAIB, ANSP, key operators	National safety performance assessment; action escalation decisions
Annually	MASP Annual Review, Safety Coordination Group (SCG)	Full SSP governance structure	MASP revision; risk priority update; SPI target recalibration



10.0 MALAYSIA'S SAFETY ACTION PLAN

This section details the key actions planned to address each National High-Risk Category. For each risk contributing factors have been identified from the safety data analysis and are presented alongside targeted actions. Each action now includes an explicit reference to the Safety Performance Indicator (SPI) it is intended to improve, establishing clear accountability between actions and measurable safety outcomes.

All safety actions within this plan are: Measurable, Time-bound, and Assigned with clear ownership. Actions are developed from analysis of MOR/VOR data through CAReS and are aligned with the Malaysian SSP, GASP, and AP-RASP.

10.1 Runway Incursion (RI)

This is defined as any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft.

Based on the data, most runway safety events occurred during taxi, line-up, and departure phases. The event narratives frequently mention misunderstood clearances, wrong taxi routing, and aircraft or vehicles entering or crossing the runway without proper authorisation. Several cases also indicate contributing factors such as high workload, loss of situational awareness, and communication issues. This indicates that runway incursion events in the data are mainly driven by human factors and communication issues, particularly during taxi and runway entry operations.

Top contributing factors:

- Misunderstanding / incorrect readback of ATC clearance
- Loss of situational awareness during taxi or landing
- High workload during approach or departure
- Poor visibility (rain, night, wet runway)
- Failure to follow assigned taxi route
- Excessive "head-down" time for Flight Management System (FMS) programming or checklist execution while the aircraft is in motion.

Risk Interaction: RI elevates MAC risk when an incursion not detected in time and is compounded by GND operations pressure during peak periods.

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	To decrease the rate of accident and incident by identifying runway incursion hotspot in Malaysia based on reported accidents, incidents and occurrences. The trends shall be analysed periodically, root causes identified, and mitigation measures implemented and monitored to reduce the rate of runway incursions.	CAAM SSP	ANSP, Air Operator, Airport Operator	On-going	Goal 3
2.	CAAM and industry to review and adapt Global Action Plan for the Prevention of Runway Incursions (GAPPRI) to Malaysian operating environment. Develop a Malaysia-specific Runway Incursion Prevention Plan (RIPP) with implementation responsibilities assigned to each stakeholder group.	CAAM ANS, AAIB	Air Operator, Flight Training Organisation, ANSP and Airport Operator	31 December 2027	Goal 3
3.	To actively utilise the Runway Safety Team (RST) at aerodromes through regular meetings to identify hazards, assess risks, recommend mitigation measures, and monitor the effectiveness of actions related to runway safety occurrences.	Aerodrome Operator	CAAM, Aerodrome Operator, Airlines	On-going	Goal 4
4.	Implement enhanced ATC–pilot communication standardisation programme, including mandatory use of read-back for all runway holding point and crossing clearances, with CAAM ANS during surveillance visits.	CAAM AIR, OPS, ANS	ANSP, Aerodrome Operator, Air Operators, Ground Handlers, and Maintenance, Repair and Overhaul Organisation (MRO)	On-going	Goal 3

10.2 Runway Excursion (RE)

A runway excursion (RE) is defined as any occurrence in which an aircraft veers off or overruns the runway surface during take-off, landing, or rollout. It includes departing the runway laterally, overrunning the runway end, or being unable to stop within the available runway length.

Analysis of data from the CAAM Aviation Reporting System (CAReS) shows that most runway excursion events occur during the landing rollout phase. Contributing factors commonly involve aircraft control issues, braking effectiveness, runway condition, and environment factors.

Top contributing factors:

- Misunderstanding / incorrect readback of ATC clearance
- Loss of situational awareness during landing
- High workload during approach
- Poor visibility (rain, night, wet runway)
- Failure to fly a stabilised approach (speed, sink rate, and configuration gates)
- Landing “long and fast” or an extended flare

Risk Interaction: RE shares causal pathways with LOC-I (unstabilised approach) and TURB (weather-induced energy management issues). Wet runway conditions during monsoon seasons create a compound seasonal risk peak.

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	CAAM and industry to review and adapt Global Action Plan for the Prevention of Runway Excursions (GAPPRE) to the Malaysian operating environment with particular emphasis on monsoon season operations, wet runway performance data, and stabilised approach enforcement	CAAM ANS, AAIB	Air Operators, Flight training organisation, ANSP and Airport Operator	Q4 2027	Goal 3
2.	To identify, analyse, and monitor runway excursion occurrences and hotspots based on national accident, incident, and occurrence data received. The trends contributing factors (e.g. weather, runway surface condition, aircraft performance, operational practices) and risk areas shall be reviewed periodically, with mitigation measures implemented and monitored.	Runway Safety Team	ANSP, Air Operator, Airport Operator	On-going	Goal 3, 4
3.	To strengthen monitoring and reporting of runway surface conditions for landing and take-off operations. Aerodrome operators shall assess and report runway surface conditions in a timely manner to ATS and AIS, where applicable, to support safe aircraft operations. A minimum reporting standard and timeline will be defined in an updated Civil Aviation Directive (CAD).	Aerodrome Operator	CAAM, Aerodrome Operator, Air Operator	Q2 2026	Goal 3
4.	To ensure effective runway surface maintenance programmes are implemented, including friction management, rubber deposit removal, routine friction testing and inspection for contaminants or pavement damage. Compliance and effectiveness shall be monitored by CAAM for continuous improvement.	Aerodrome Operator	Aerodrome Operator, CAAM AGA	On-going	Goal 3

10.3 Loss of Control In-Flight (LOC-I)

Defined as loss of aircraft control or deviation from intended flightpath while airborne.

The LOC-I-related records extracted from the dataset indicate a strong correlation with unstable approaches, manual handling difficulties, and adverse weather conditions (crosswind, turbulence, wind shear).

Several reports describe autopilot or flight control anomalies that required sudden pilot intervention. In multiple cases, control difficulties occurred during approach and climb, where workload is typically high. The findings suggest that LOC-I events within the dataset are mainly associated with aircraft handling under challenging environmental or system conditions.

Top contributing factors:

- Unstable approach not corrected early
- Incorrect control input by flight crew
- Adverse weather (crosswind, wind shear, turbulence)
- Autopilot / flight control anomalies
- Spatial disorientation in Instrument Meteorological Conditions (IMC)
- Aerodynamic stall, often resulting from inadequate monitoring of Angle of Attack (AOA) or energy state
- Deterioration of manual flying skills due to excessive reliance on automation

Risk Interaction: LOC-I is a downstream risk driven by TURB, GNSS RFI (navigation degradation), and SCF-NP (flight control failures). LOC-I in turn elevates MAC risk if the loss of control results in an uncontrolled trajectory change in controlled airspace.

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	To promote effective use of flight data analysis/ flight data monitoring (FDA/FDM) to identify precursors to LOC-I events, such as unstable approaches, automation mode confusion, and energy management issues.	CAAM OPS	Air Operators, ANSP	Q4 2026	Goal 3, 5
2.	To encourage proactive safety reporting and Just Culture principles to support early identification of LOC-I hazards and unsafe operational trends. Reporting rates to be tracked as part of SO-5 SPI.	CAAM OPS	All aviation stakeholders	2028	Goal 2
3.	To improve flight crew training and awareness, including elements of Upset Prevention and Recovery Training (UPRT) and human factors, situational awareness, decision-making and Threat and Error Management (TEM) during all phases of flight. UPRT to be included as mandatory element in recurrent training for airline pilots by Q4 2027.	Air Operator	CAAM OPS, Flight Training Organisations (FTOs)	Q4 2027	Goal 3

10.4 Mid Air Collision (MAC)

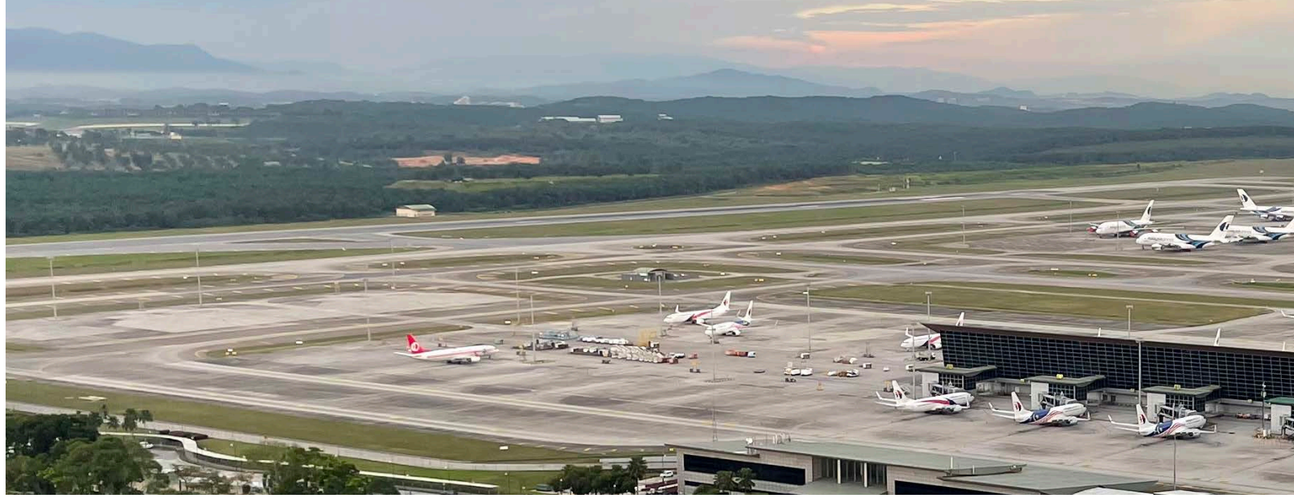
Defined as a collision between aircraft while both are airborne. This includes airprox events, ACAS alerts, loss of separation, as well as near-miss events. MAC shall be considered a top safety risk due to expected increase in air traffic movements and the observed rise in Traffic Collision Avoidance System Resolution Advisory (TCAS-RA).

Top contributing factors:

- Loss of separation between aircraft
- ATC vectoring / altitude assignment conflict
- Readback / hear back errors
- Late detection of conflicting traffic
- High traffic density airspace
- Integration of new entrants (UAS/Drones) into controlled airspace
- Radio Frequency Interference (RFI) on GNSS signals, including jamming and spoofing

Risk Interaction: MAC is a downstream risk of RI, GNSS RFI, Cybersecurity failures, and LOC-I. As traffic volumes grow, the MAC risk envelope expands.

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	Develop new revision on NANP aligned with Malaysia's airspace restructuring initiatives ICAO Global Air Navigation Plan (GANP), with MAC risk reduction as an explicit design requirement. NANP revision to include reduced vertical/lateral separation standards where surveillance capability permits.	CAAM ANS	Air Operator, Flight training organisation, ANSP and Airport Operator	Q4 2028	Goal 3
2.	To identify MAC hotspots, through analysis of TCAS-RA events, vertical rate exceedances, level-off deviations, and conflicting traffic patterns. Hotspot data to be incorporated into risk score updates for route and sector design review.	ANSP	CAAM SSP, ANS	On-going	Goal 5
3.	To identify and analyse MAC-related occurrence and precursors, including TCAS-RA events, loss of separation, and airspace complexity factors. Publish annual MAC precursor trends report through CAAM SSP.	CAAM SSP	CAAM ANS, ANSP, Air Operator	Q4 2028	Goal 5
4.	To enhance air traffic management procedures and separation standards to mitigate MAC risk, particularly in high-density and complex airspace. Review combined ATC sector operations procedures in light of December 2024 TCAS RA serious incident.	ANSP	CAAM ANS	Q2 2027	Goal 3
5.	To improve training and awareness programmes for pilots and air traffic controllers on collision avoidance, TCAS-RA response, and human factors related to MAC risk. Include TCAS RA compliance monitoring in FDM programme event sets.	CAAM OPS, CAAM ANS	Air Operator and ANSP	2028	Goal 3



10.5 Turbulence Encounter (TURB)

Refer to In-flight turbulence encounter. The turbulence records in the dataset mainly describe encounters with convective weather (Cumulonimbus (CB) clouds) and clear air turbulence. Many reports indicate that turbulence was encountered suddenly, with limited warning, and in some cases seatbelt signs were activated late, leading to injuries or cabin disruptions. Several narratives also highlighted that route deviation decisions were delayed. This indicates that turbulence events in the data are largely linked to limitations in weather anticipation and avoidance rather than mechanical issues.

Top contributing factors:

- Flight through convective weather / CB clouds
- Inadequate weather briefing or forecast interpretation
- Sudden clear air turbulence (CAT)
- Delay in activating seatbelt sign
- Late route deviation

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	To review operator policies on convective weather avoidance margins and decision-making thresholds for route deviation.	CAAM OPS	Air Operator	Q4 2026	Goal 3
2.	Develop and issue a CAAM OPS guidance circular on minimum weather avoidance standards.	CAAM OPS	Air Operator, ANSP	Q4 2026	Goal 3
3.	To improve ATC-pilot coordination procedures for weather deviation requests to minimise rerouting during convective activity. Review ANSP procedures for weather deviation prioritisation and develop a fast-track deviation protocol for severe convective activity.	ANSP	CAAM OPS & ANS, Air Operator	Q2 2027	Goal 3
4.	To improve real-time weather data sharing and turbulence Pilot Reports (PIREP) between operators and ATC. Establish a structured PIREP submission process integrated into CAReS 2.0, with data shared with METMalaysia for forecast improvement	ANSP	CAAM ANS METMalaysia, Airport, Air Operator	Q3 2027	Goal 5

10.6 Global Navigation Satellite System (GNSS) Radio Frequency Interference (RFI)

Refer to an occurrence involving degradation, jamming, or spoofing of Global Navigation Satellite System (GNSS) signals affecting aircraft navigation or ATC surveillance. GNSS RFI is considered a top safety risk, with an increasing number of reports captured in CAReS, reflecting its growing operational and global significance.

GNSS RFI reports in the dataset consistently refer to signal degradation or loss of GNSS position, often occurring in the same geographic areas and at similar flight levels. Some reports describe multiple aircraft experienced similar interference, suggesting an external source rather than aircraft system failure. In several cases, crews had to revert to conventional navigation aids (VOR/Distance Measuring Equipment (DME)). This indicates that the dominant factor in the data is external GNSS interference, compounded by dependence on satellite navigation.

Contributing factors:

- External jamming / interference source
- Repeated interference in same geographic area
- Weak GNSS signal reception
- Crew reliance on GNSS without early backup navigation
- Incomplete location data of interference
- Proximity to geopolitical conflict zones and military exercise areas where high-power electronic warfare (EW) assets are deployed

Risk Interaction: GNSS RFI is a driver of LOC-I (navigation degradation → automation confusion) and MAC (aircraft deviating from cleared routing). It also undermines Cybersecurity resilience by masking the boundary between technical failure and deliberate attack.

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	Mandatory monitoring and structured reporting of GNSS interference events within Malaysian Flight Information Region (FIR) via CAReS, including geographic coordinates, altitude, aircraft type, and operational impact. CAAM to publish quarterly RFI occurrence summaries.	Air Operator	CAAM SSP, Air Operator, ANSP, Airport Operator	Q4 2026	Goal 5
2.	Analyse RFI occurrences to identify sources, patterns, and operational impact, and distinguish jamming from spoofing events.	CAAM SSP	ANSP, Air Operator	Q4 2026	Goal 5
3.	To maintain and review GNSS interference mitigation procedures for flight operations and air traffic management, including contingency measures for affected routes or approaches. Issue updated CAD with mandatory backup navigation proficiency requirement for all Malaysian AOC holders.	CAAM OPS, ANS	ANSP, Air Operator	Q3 2027	Goal 3
4.	Coordinate with international and regional authorities to share GNSS interference data and participate in joint mitigation initiatives. Establish multilateral RFI data sharing with Singapore, Thailand and Indonesia via formal data sharing agreements.	CAAM External Affairs	ICAO, CAAM SSP, ANSP, Regional States, Air Operator, Malaysian Communications and Multimedia Commision (MCMC), Malaysian Space Agency	Q4 2027	Goal 1, 4

10.7 On Board Fire

Refer to occurrences of fire, smoke, heat, or chemical reaction attributable to dangerous goods (including lithium batteries) carried as cargo or in passenger baggage.

Based on the dataset, most lithium battery events involve power banks or electronic devices found in baggage, often described as undeclared or improperly packed. Several cases involve smoke or overheating detected in the cabin or cargo hold. The data also shows that these items were usually discovered after the flight had started, not during screening. This indicates that the primary driver in the dataset is non-compliance with dangerous goods requirements, especially due to passenger awareness and screening gaps.

Top contributing factors:

- Undeclared dangerous goods in baggage
- Power banks in checked baggage
- Passenger lack of awareness of Dangerous Goods (DG) rules
- Battery overheating during flight
- Screening failure to detect dangerous goods
- Insufficient ground handling personnel awareness regarding dangerous goods restrictions and fire characteristics

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	To strengthen screening procedures and introduce targeted random baggage re-screening for high-risk routes or peak travel periods. CAAM AVSEC to issue updated screening protocol incorporating lithium battery detection as a mandatory check item.	CAAM Aviation Security	Airport operators, Ground Handlers	30 April 2026	Goal 3
2.	To improve declaration prompts during online booking and mobile check-in to require passenger acknowledgment of dangerous goods rules, with specific reference to power bank and e-cigarette restrictions. Airlines to submit compliance evidence to CAAM Aviation Security by Q4 2026	Air Operator	CAAM Aviation Security, OPS, Ground Handlers	Q4 2026	Goal 3
3.	Improve data collection and trend analysis within CAReS 2.0 to identify repetitive non-compliance patterns and high-risk passenger segments. DG occurrence data to be shared with International Air Transport Association (IATA) DGR working group.	CAAM SSP	CAAM Aviation Security, Airport Operator, Air Operators	Q4 2026	Goal 5
4.	Engagement with customs and national consumer agencies to regulate sale labelling of high-capacity power banks with aviation safety team. Establish a multi-agency working group (MOT, Royal Malaysian Customs Department (KASTAM), Domestic Trade) to address supply chain-level risk.	MOT, CAAM OPS	National Airport Facilitation Committee (NAFC)	Q2 2027	Goal 3

10.8 Controlled Flight Into Terrain (CFIT)

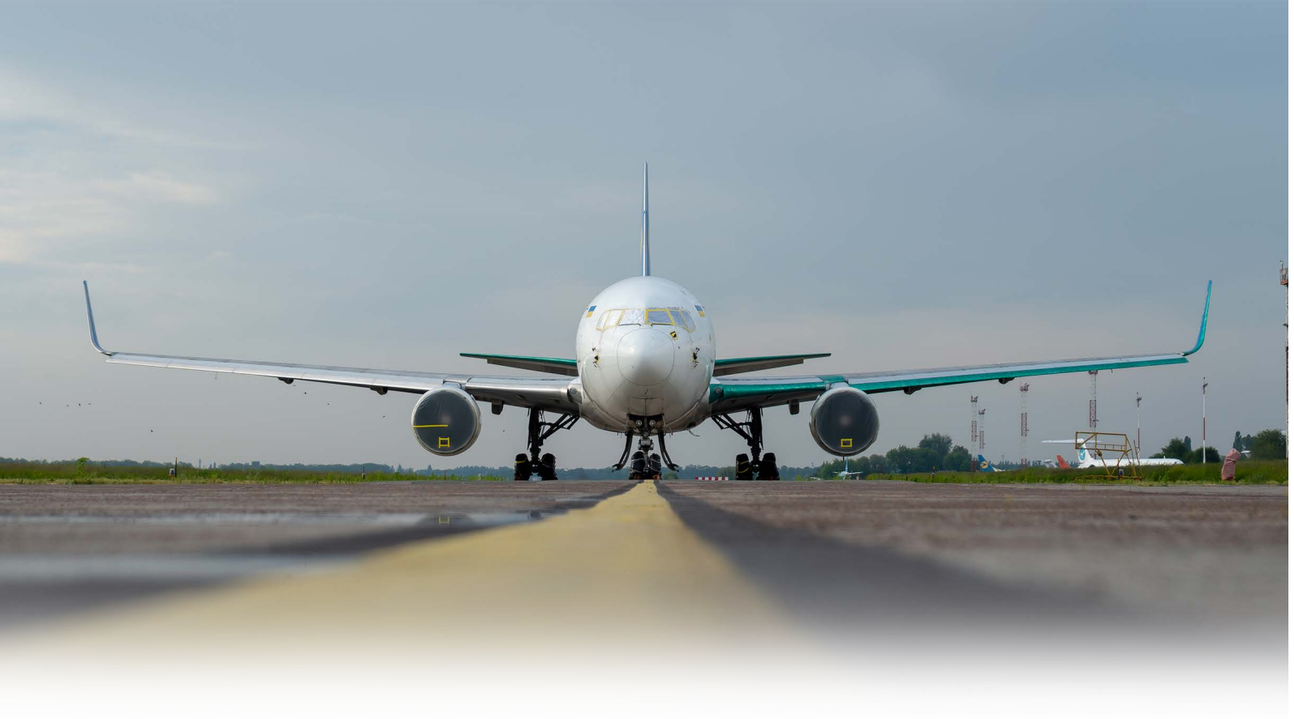
Refers to inflight collision or near-collision with terrain, water, or obstacle without indication of loss of control.

Based on the current safety data analysis (0 accidents and 0 serious incidents in both 2023 and 2024 per Appendix C), CFIT is not categorised as a significant National High-Risk Category. The following actions are therefore designated as monitoring activities within the SSP performance monitoring framework, not active risk mitigation initiatives. If CFIT-related occurrences emerge in national data, these actions will be escalated to N-HRC status at the next Annual MASP Review.

Example of contributing factors based on the GASP:

- Flight in adverse environmental conditions
- Inaccurate approach design and inadequate documentation (for approaches with vertical guidance (APV) or localiser performance with vertical guidance (LPV))
- Phraseology used (standard versus non-standard)
- Pilot fatigue, sensory illusion and loss of situational awareness
- Global navigation satellite system (GNSS) radio frequency interference (FRI)

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	CAAM to review whether CFIT vulnerabilities are being addressed during SMS audits and surveillance, ensuring alignment with Malaysian regulatory requirements and local operating environments. TAWS/EGPWS events to be tracked as leading indicators in Appendix B SPI monitoring.	CAAM OPS	Air Operator, ATOs	Q2 2027	Goal 3
2.	To review stabilised approach criteria and standard operating procedures (SOPs) adherence to maintain CFIT mitigation effectiveness, particularly during approach and landing phases in challenging terrain or adverse weather conditions. Findings to be shared at annual MASP review to inform CFIT risk classification decision.	CAAM OPS	Air Operator	2028	Goal 3
3.	To strengthen oversight of terrain awareness and warning system (TAWS) implementation and operational use, ensuring effectiveness through procedures, training, and FDM monitoring.	CAAM OPS	Air Operator	2028	Goal 3



10.9 Abnormal Runway Contact (ARC)

Defined as any landing or take-off involving abnormal runway or landing surface contact. In AP-RASP, ARC is one of four (4) incident types that, although not associated with high fatality risk, represent the most frequent categories of accidents and serious incidents across ICAO regions.

Examples of possible contributing factors:

- High sink rate on approach
- Improper flaring techniques
- Windshear on approach
- Tailwind landings
- Unstabilised approaches that continue to land

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	CAAM to identify, analyse, and monitor ARC-related occurrences and precursors, including hard landings, tail strikes, abnormal touchdown events, and nose-gear contacts, with particular focus on flight training operations. Publish annual ARC trend analysis through CAAM SSP.	CAAM SSP	CAAM OPS	Q2 2028	
2.	To improve pilot competency and operational discipline through enhanced training and checking programmes, including stabilised approach criteria, go-around decision-making, landing technique. Specific focus on Flight Training Organisations given 2024 ARC incident pattern.	CAAM OPS	Air Operator, ATOs	Q1 2028	

10.10 Aviation Cybersecurity and Data Integrity

Refers to threats, vulnerabilities, or deliberate attacks targeting Malaysia's aviation information systems, operational technology, and digital communication networks. This risk is considered a top concern in Malaysia due to the growing of data integrity records mainly involve system outages, database errors, or incorrect data entries rather than external cyberattacks.

Several reports describe system unavailability or wrong information being displayed or stored, requiring manual workarounds. Human error during system operation or configuration is frequently implied. This shows that within the dataset, the dominant contributing factors are system reliability issues and human configuration or data handling errors, rather than deliberate intrusion.

Top contributing factors:

- System or database malfunction
- Human error in data entry or system configuration
- Weak access control / authentication
- Dependence on third-party systems
- Inadequate system monitoring

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	Establish a national aviation cybersecurity plan to improve threat intelligence sharing between CAAM, airport operators, ANSP and national cybersecurity agencies. Plan to include specific protocols for aviation-sector cyber incident notification and response.	CAAM Aviation Security	MOT, Cybersecurity Malaysia, Malaysian Communications and Multimedia Commission (MCMC), ATM Cybersecurity	31 March 2027	
2.	To develop and implement cybersecurity policies and standards aligned with national and international frameworks to safeguard operational and safety-critical data. Standards to include mandatory cybersecurity self-assessment for all critical aviation infrastructure operators.	CAAM Aviation Security	CAAM AVSEC, National Cyber Security Agency (NACSA), CyberSecurity Malaysia (CSM)	31 March 2027	
3.	Conduct regular cybersecurity audits, assessments, and penetration tests for critical aviation infrastructure to identify vulnerabilities and improve system resilience. Results to be treated as safety-critical data under Just Culture protections.	CAAM Aviation Security	Airport Operator, Air Operator, ANSP	31 December 2028	

10.11 System/Component Failure or Malfunction Non-Powerplant (SCF-NP)

Defined as failure or malfunction of an aircraft system or component – other than the powerplant. The SCF-NP events in the dataset repeatedly involve avionics, electrical systems, sensors, landing gear, and pressurisation components. Many records show in-flight warnings or abnormal indications, followed by troubleshooting or return to base. Some entries also mention deferred defects under Minimum Equipment List (MEL) or repeated faults. This suggests that these events are driven mainly by technical failures and component degradation, sometimes compounded by maintenance deferrals.

Top contributing factors:

- Avionics or sensor malfunction
- Electrical system faults
- Flight control anomalies
- Deferred defects / MEL issues
- Aging or worn components
- Supply chain issues

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	Strategic engagement with the stakeholders to enhance awareness and proactive risk management of system/component failures or malfunctions – non-powerplant (SCF-NP) through collaborative review of reliability data and safety performance metrics.	CAAM AIR	Air Operator, MRO, Continuing Airworthiness Management Organisation (CAMO)	31 December 2026	Goal 1, Target 1.3
2.	Enhanced risk-based oversight to ensure the effective implementation of the Safety Management System (SMS) with particular emphasis on controls that mitigate the risk of system/component failures or malfunctions – non-powerplant (SCF-NP).	CAAM AIR	Air Operator, Maintenance Organisation, CAMO.	31 December 2027	

10.12 Ground Safety and Ramp Operations

Refer to occurrences during or as a result of ground handling operations. Ground and ramp-related records frequently describe ground handling equipment contacting aircraft, incorrect marshalling, or vehicles operating close to aircraft. Several reports also highlight time pressure during turnaround and procedural deviations. Environmental factors such as wet or slippery apron surfaces appear in some cases. This indicates that ground events in the dataset are primarily caused by human error under operational pressure, rather than equipment design problems.

Top contributing factors:

- Ground handling equipment striking aircraft
- Human error by ramp personnel
- Poor communication between ground crew
- Time pressure during turnaround
- Inadequate supervision
- Workforce shortages
- Long working hours and fatigue
- Deficiencies in ground service equipment maintenance

Risk Interaction: Ground safety pressure is a driver of Runway Incursion risk (vehicles entering protected areas due to rushed operations). Both risks share the same root cause of insufficient supervision during high-tempo periods.

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	Improve ramp communication protocols and marshalling certification across operators. Issue updated minimum standard for marshalling training and mandate its application in ground handling company operations manuals, verified during CAAM ramp safety audits.	CAAM OPS	Ground Handling Companies	Q4 2026	Goal 3
2.	Enhance supervision requirements during peak turnaround periods and adverse weather periods conditions. Airport operators to define minimum supervision ratios for wide-body aircraft turns and night operations in their aerodrome safety management system.	National Slot Coordination Malaysia (NASCM)	Air Operators, Ground Handlers	Q4 2027	Goal 3
3.	Improve oversight and ramp safety audits focusing on high-frequency ground damage occurrences airport CAAM Flight Operations to include ramp safety as a standing audit item with standardised findings taxonomy for trend analysis across airports.	CAAM OPS	Ground Handling Companies, Airport Operators	Q4 2026	Goal 1
4.	Strengthen human factors and ramp safety training programmes addressing situational awareness, communication, and time pressure management. All ground handling company ramp supervisors to complete a CAAM-approved human factors in ground operations course by Q4 2027.	CAAM OPS	Air Operators, Ground Handlers	Q4 2027	Goal 3

11.0

KEY CHALLENGES

In alignment with the global organisational challenges identified in the GASP 2026-2028, Malaysia continues to face several key challenges that influence the effectiveness of its SSP implementation and overall safety performance:

1. Financial and Resource Constraints

Limited financial and human resources allocated may affect the timely implementation of safety initiatives, capacity-building programmes and the sustainment of effective regulatory oversight.

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	To prioritise safety-critical activities through a risk-based allocation of financial and human resources, focusing Tier 1 N-HRC actions and SSP maturity development activities.	CAAM Safety and Security Regulatory Group (SRG)		2028	Goal 1
2.	To optimise the allocation of available financial, technical and human resources, through structured annual safety budget planning linked to risk priorities.	CAAM SRG, AAIB	ANSP, Air Operator, Airport Operator	On-going	Goal 1

2. Shortage of Qualified Technical Personnel (QTP)

Challenges in recruiting, developing and retaining qualified technical personnel, particularly in critical safety oversight areas such as aircraft accident investigation, flight operations, airworthiness and aerodrome inspectors. The limited availability of subject matter experts (SMEs) in emerging domains may impact the effectiveness and sustainability of safety oversight.

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	To strengthen a structured workforce planning and recruitment including targeted hiring, career progression pathways and succession planning for critical technical roles. Workforce plan to cover SSP, airworthiness, flight operations, ANS, aerodrome, and AAIB disciplines.	CAAM Organisational Development-Human Capital, AAIB	All divisions	On-going	Goal 1
2.	To develop and expand SME capacity in emerging risk areas (GNSS RFI, cybersecurity, UAS, advanced air mobility) through specialised training and international collaboration with ICAO, RASG-APAC, and peer state regulators.	CAAM People Development-Human Capital	All divisions	On-going	Goal 1
3.	To enhance technical competency through continuous training, on-the-job development, and certification programmes in core oversight areas. All CAAM inspectors to maintain currency with mandatory annual technical training hours tracked through Human Capital system.	CAAM People Development-Human Capital	External Affairs	On-going	Goal 1

3. Regulatory and Process Gaps

Gaps and inconsistencies in regulatory frameworks, guidance materials and internal processes may effect the uniform and timely implementation of safety requirements. Delays in regulatory updates, overlapping responsibilities and unclear processes may limit effective safety oversight, safety data integration and alignment with ICAO Standards and Recommended Practices (SARPs).

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	To establish a prioritised regulatory update roadmap, including timelines for the development, amendment of regulations and CADs, prioritised by N-HRC relevance and ICAO SARP compliance gap analysis.	CAAM Governance & Compliance	Legal and Secretarial, All Divisions	On-going	Goal 1
2.	To conduct a structured review of existing aviation regulations, CADs and internal procedures to identify gaps, overlaps and areas requiring alignment with ICAO SARPs. Review outputs to be tabled at MSCC for endorsement.	CAAM Compliance & Governance, AAIB	Legal and Secretarial, All Divisions	On-going	Goal 1

4. Varying Levels of SSP and SMS Implementation Across Stakeholders

Differences in the level of State Safety Programme (SSP) and Safety Management System (SMS) implementation across aviation stakeholders may result in inconsistent safety performance, uneven risk management maturity and reduced effectiveness of State-level safety oversight. Variations in organisational capability, resources and safety culture may limit the consistent application of safety management principles throughout the aviation system.

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	To improve safety data sharing and reporting mechanisms between CAAM and stakeholders. Develop a tiered SMS maturity assessment framework to identify and support organisations with implementation gaps.	CAAM SSP	Other States, ANSP, Air Operator, Airlines, Aerodrome Operators	Q3 2027	Goal 2
2.	To promote safety culture and Just Culture practices throughout engagement programmes, workshops and annual Malaysia Aviation Safety Seminar (MASS).	CAAM SSP	Malaysia Aviation Academy (MAvA), Aviation Industry, Academia	Q3 2026	Goal 2

5. Safety Data and Information Management Limitations

Limitations in the collection, integration, analysis and sharing of safety data may affect the State's ability to identify emerging risks, monitor safety performance and implement timely, data driven safety interventions.

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	To improve the quality of information in the safety reporting system by enhancing interaction between the stakeholder interaction and reporting culture through Just Culture promotion and voluntary reporting incentive programmes.	CAAM SSP	ANSP, Air Operator, Airlines, Aerodrome Operators, MRO	Q1 2027	Goal 5

6. Introduction of Low Altitude Aviation Activities

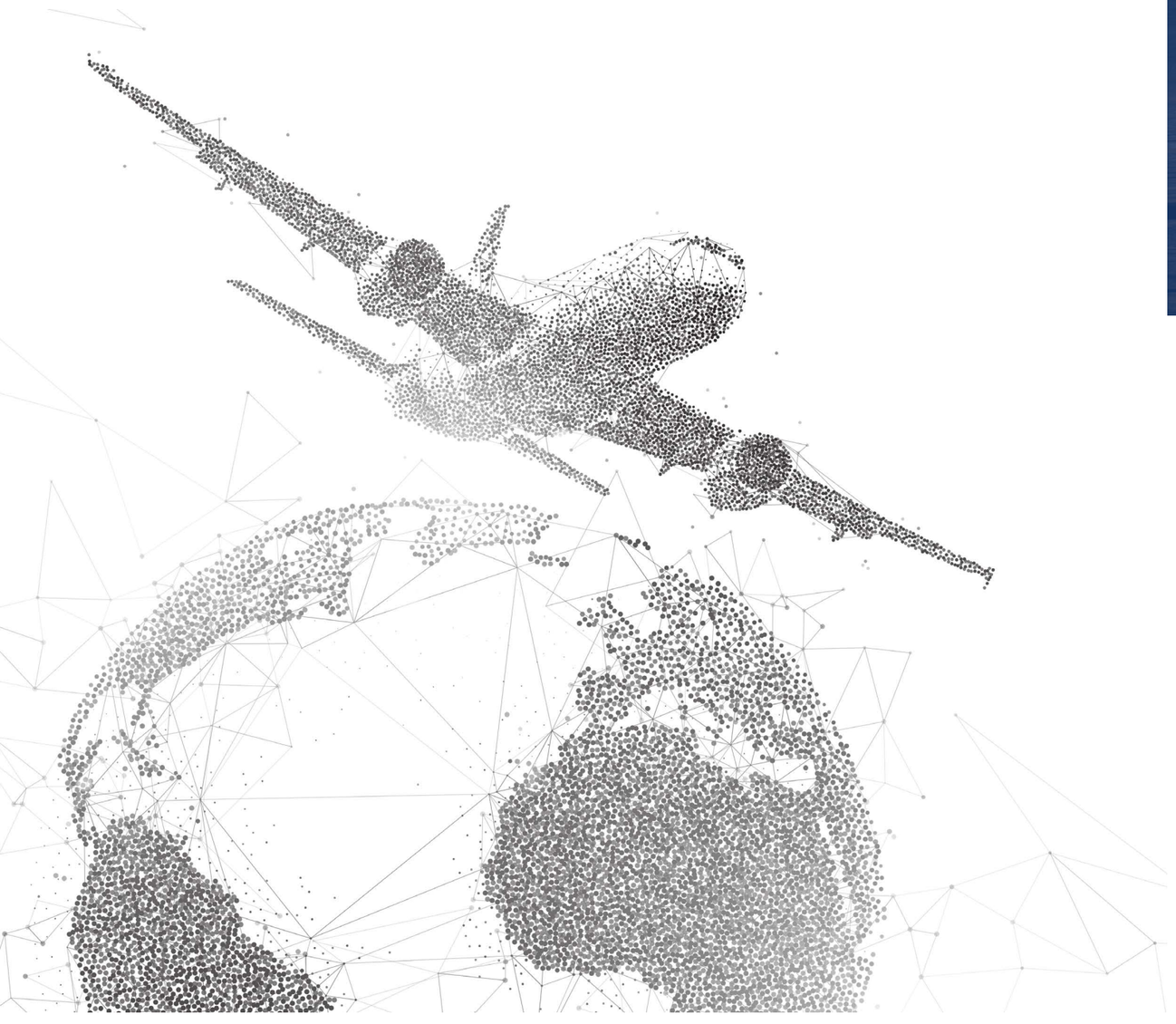
Asia is seeing a growth in development of Low Altitude Aviation Activities including manned and unmanned aircraft operating below 3,000 feet. These emerging operations are likely to enter service in Malaysia within the next few years. As a results, Malaysia needs to establish a safe operating environment for this new and novel technology. CAAM has taken initial steps to regulate these activities through the regulations governing UAS operations.

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	Establish the regulations for the UAS certification and operations, including registration, operational authorisation, and safety requirements proportionate to operational risk.	CAAM OPS	UAS/LAE Operators, ANSP	Q2 2028	Goal 1
2.	Establish the regulations for the Low Altitude Ecosystem (LAE) operations, including Advanced Air Mobility (AAM) corridors and U-space framework.	CAAM OPS	UAS Manufacturers, UAS/ LAE Operators	Q4 2027	Goal 1
3.	Establish the Air Traffic Management (ATM) to cover the LAE operations within Malaysian airspace, integrating UAS traffic management with conventional ATM	CAAM ANS	ANSP, UAS/ LAE Operators	Q4 2027	Goal 1
4.	Implement the Safety Management System (SMS) for LAE operators harmonise to operational complexity and risk exposure.	CAAM OPS	CAAM SSP, UAS/LAE Operators, ANSP	Q4 2028	Goal 2

7. Safety Culture Improvement and Just Culture implementation

In recognition of the important role that safety culture and Just Culture play in enabling effective MSP and effective SMS for industry the following actions are planned.

No.	Actions	Lead	Stakeholders	Target Date	Link to GASP or RASP
1.	Conduct mandatory Just Culture seminar and workshop for CAAM and AAIB management, CSIs and accident investigators.	CAAM SSP, AAIB	CAAM Regulatory Divisions	Q3 2027	
2.	Conduct a Just Culture seminar and workshop for industry Accountable Executives and senior managers.	CAAM SSP	CAAM Safety Stakeholders	Q4 2027	

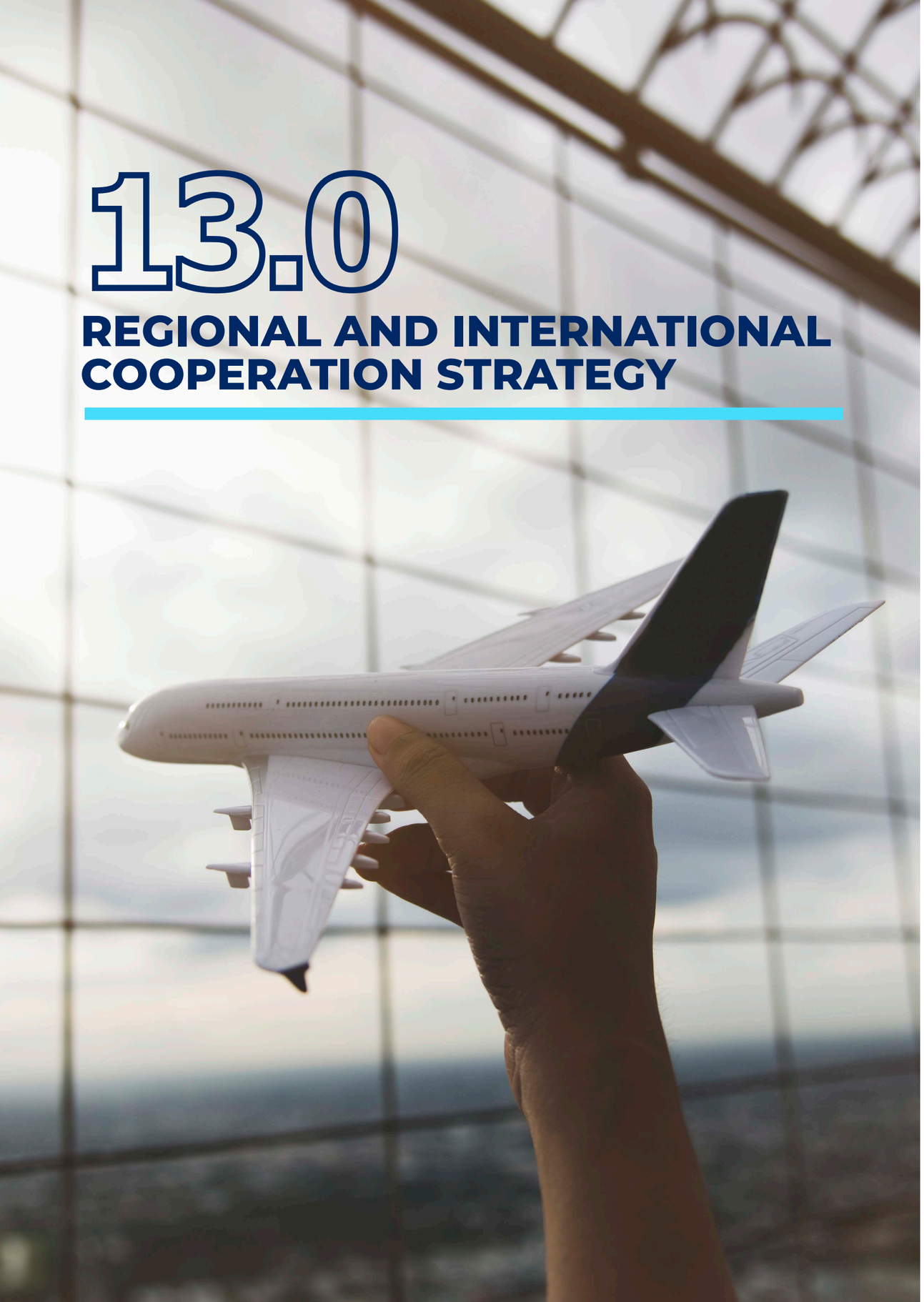


12.0 PLAN REVIEW AND ADAPTATION PROTOCOL

A fundamental characteristic of a systemic safety plan is its ability to learn and self-correct. The MASP 2026–2028 institutes a formal Plan Review and Adaptation Protocol to ensure the plan remains a living instrument of safety governance rather than a static document.

12.1 Annual Review Cycle

Review Activity	Frequency	Lead	Output	Governance Authority
SPI Dashboard Update	Monthly	CAAM SSP Unit	Internal dashboard; anomaly alerts	CAAM CEO
Quarterly SPI Performance Review	Quarterly	Director of Safety Regulation	Quarterly SPI report; action status update	CAAM CEO
National Safety Performance Assessment	Annually	CAAM SSP via MSCC	National safety performance report	MSCC (MOT, CAAM, AAIB, ANSP, key operators
Annual MASP Formal Review	Annually	CAAM SSP	MASP revision document; updated risk priorities; recalibrated SPI targets	SCG endorsement
MASP Triennial Full Revision	2029	CAAM SSP	New MASP edition (2029–2031)	CAAM Authority Members



13.0

REGIONAL AND INTERNATIONAL COOPERATION STRATEGY

13.1 Regional Engagement Priorities

Forum / Partner	Priority Engagement Area	Lead	Target Outcome
RASG-APAC	N-HRC alignment; SPI benchmarking with regional peers; AP-RASP implementation review	CAAM SSP	Annual RASG-APAC contribution report.
COSCAP-SEA	Regulatory harmonisation; shared training and SME development	CAAM Compliance / QTP	Participation in minimum 2 COSCAP-SEA activities per year.
Civil Aviation Authority of Singapore (CAAS)	GNSS RFI bilateral data sharing; shared airspace MAC risk (KLATCC/ Singapore FIR boundary)	CAAM External Affairs / ANS	Formal bilateral RFI data sharing agreement by Q3 2027.
Civil Aviation Authority of Thailand (CAAT) / Indonesia Directorate General of Civil Aviation (DGCA)	GNSS RFI regional triangle; turbulence data sharing; safety occurrence data exchange	CAAM External Affairs	Bilateral safety data exchange Memorandum of Understanding (MoU) by 2028.
IATA	SCF-NP reliability data; DG reporting; FDM programme standards	CAAM Airworthiness / Flight Ops	IATA STEADES data access for Malaysian operators.
Asia Pacific Regional Safety Team (AP-RAST)	Regional safety initiatives, RI and ARC mitigation strategies; best practice sharing	CAAM SSP	Active contribution to AP-RAST implementation and annual regional safety performance updates.
South-East Asia Regional Aviation Safety Team (SEARAST)	Regional aviation safety trend analysis; emerging risk coordination (RFI, TURB, Cybersecurity)	CAAM SSP	Integration of SEARAST outputs into MASP updates and national risk picture.
Regional Data Sharing Initiative	Cross-States and regional safety data exchange (RFI, TURB, occurrences); predictive analytics development	CAAM SSP	Established structure data sharing framework and regional data integration capability by 2027

Appendix A
All Abbrevations and Acronyms

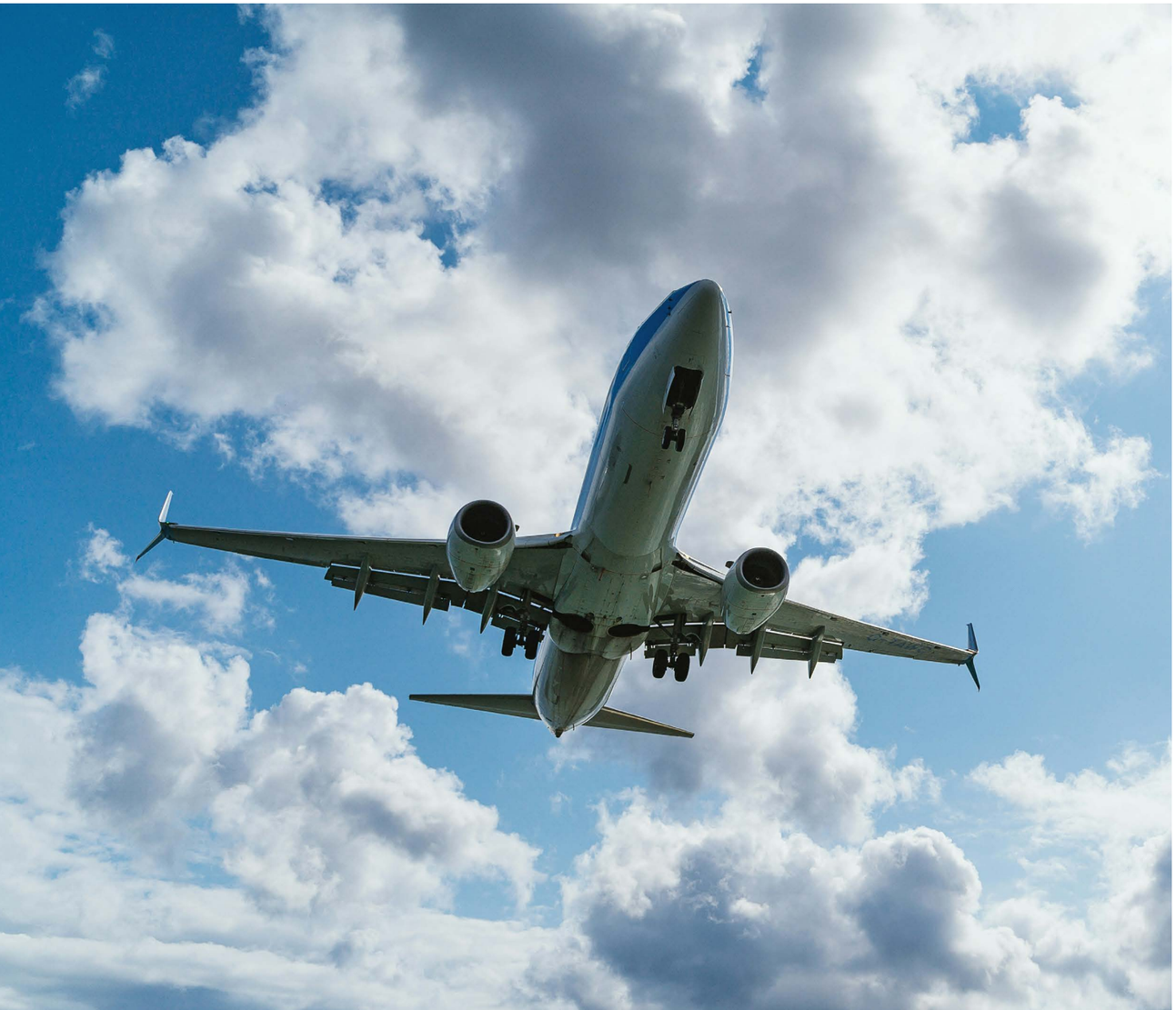
Abbreviation	Full Name / Meaning (Based on Source Context)
AAIB	Air Accident Investigation Bureau
ACAS	Airborne Collision Avoidance System
A-CDM	Airport-Collaborative Decision Making
ADREP	Accident/Incident Data Reporting
ADSF	Aviation Data Sharing Framework
AGA	Aerodrome and Ground Aids
AAM	Advanced Air Mobility
ANSP	Air Traffic Service Providers / Air Navigation Service Providers
AOC	Air Operator Certificate
AOG	Aircraft On Ground
AP-RASP	Asia-Pacific Regional Aviation Safety Plan
AP-RAST	Asia Pacific Regional Safety Team
APV	Approaches with Vertical Guidance
ARC	Abnormal Runway Contact
ATC	Air Traffic Control
ATM	Air Traffic Management
ATS	Air Traffic Services
CAD	Civil Aviation Directive
CAAM	Civil Aviation Authority of Malaysia
CAMO	Continuing Airworthiness Management Organisation
CAR	Civil Aviation Regulation
CARES	CAAM Aviation Reporting System
CAT	Clear Air Turbulence
CFIT	Controlled Flight Into Terrain
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
COSCAP-SEA	Cooperative Development of Operational Safety and Continuous Airworthiness Programme – South East Asia
CRM	Crew Resource Management
CSM	CyberSecurity Malaysia
EI	Effective Implementation
EGPWS	Enhanced Ground Proximity Warning System
EVTOL	Electric Vertical Take-off and Landing
FDA	Flight Data Analysis
FDM	Flight Data Monitoring
FIR	Flight Information Region
FL	Flight Level
FOD	Foreign Object Debris
FTOS	Flight Training Organisation
GANP	Global Air Navigation Plan
GAPPRE	Global Action Plan for the Prevention of Runway Excursions
GAPPRI	Global Action Plan for the Prevention of Runway Incursions
GASP	Global Aviation Safety Plan
G-HRCS	Global High-Risk Categories
GNSS	Global Navigation Satellite System
GPU	Ground Power Unit
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
IMC	Instrument Meteorological Conditions
ISTARS	Integrated Safety Trend Analysis and Reporting System
KLATCC	Kuala Lumpur Air Traffic Control Centre
LAE	Low Altitude Ecosystem
LOC-I	Loss of Control In-flight
LPV	Localiser Performance With Vertical Guidance
MAC	Mid-Air Collision
MADB	Malaysia Aviation Decarbonisation Blueprint
MAHB	Malaysia Airports Holdings Berhad
MASP	Malaysia Aviation Safety Plan
MASS	Malaysia Aviation Safety Seminar
MAVA	Malaysia Aviation Academy
MCMC	Malaysian Communications and Multimedia Commission
MEL	Minimum Equipment List
METMALAYSIA	Department of Meteorology Malaysia
MORS	Mandatory Occurrence Reports
MOT	Ministry of Transport
MRO	Maintenance Repair Overhaul
MSCC	Malaysia Safety Coordination Council
NACSA	National Cyber Security Agency
NAFC	National Airport Facilitation Committee (NAFC)
NANP	National Air Navigation Plan
NCASP	National Civil Aviation Security Programme
NCII	National Critical Information Infrastructure
NETR	National Energy Transition Roadmap
N-HRCS	National High-Risk Categories
NM	Nautical Miles
PBN	Performance-Based Navigation
PIREP	Pilot Reports
QTP	Qualified Technical Personnel
RASG-APAC	Regional Aviation Safety Group – Asia Pacific
RASP	Regional Aviation Safety Plan
RE	Runway Excursion
RFI	Radio Frequency Interference
RI	Runway Incursion
RST	Runway Safety Team
SAF	Sustainable Aviation Fuels
SARPS	Standards and Recommended Practices
SCF–NP	System/Component Failure or Malfunction (non-powerplant)
SEARAST	South-East Asia Regional Aviation Safety Team
SEIS	Safety Enhancement Initiatives
SMES	Subject Matter Experts
SMS	Safety Management System
SOPS	Standard Operating Procedures
SPIS	Safety Performance Indicators
SPTS	Safety Performance Targets
SSP	State Safety Programme
TAWS	Terrain Awareness and Warning System
TCAS	Traffic Collision Avoidance System Resolution Advisory
TEM	Threat and Error Management
TURB	Turbulence Encounter
UAS	Unmanned Aircraft System
UPRT	Upset Prevention and Recovery Training
USOAP CMA	Universal Safety Oversight Audit Programme Continuous Monitoring Approach
UTC	Coordinated Universal Time
VORS	Voluntary Occurrence Reports

Appendix B – State Safety Objectives and Performance Indicators

Note: Malaysia's State Safety Objectives and corresponding Safety Performance Indicators (SPIs) to monitor national aviation safety performance. The SPIs are measure primarily per 10,000 aircraft movements and are supported by specific operational guidance.

State Safety Objectives	State SPIs	Guidance
To maintain zero fatal accidents in commercial operations by Malaysian AOC Holders	Number of fatal accidents in commercial operations per 10,000 aircraft movements	
	Number of occurrence reports with the potential of a CFIT event per 10,000 movements	TAWS/Enhanced Ground Proximity Warning System (EGPWS) warnings High sink rates
	Number of safety occurrence reports with the potential for a Loss of Control event per 10,000 movements	Stall warning / stick shaker events Flight Control failures
	Number of TCAS RA's per 10,000 movements	
To achieve a reduction in the number of serious incidents in commercial operations by Malaysian AOC Holders	Number of serious incidents in commercial operations per 10,000 aircraft movements	
	Number of In-Flight Engine Shutdowns per 10,000 aircraft movements	SCF-PP events
	Number of In-flight system or component failures per 10,000 flights	SCF-NP events
	Number of Dangerous Goods related safety reports per 10,000 movements	Lithium Battery events Undeclared DG DG damage / overheating or spillage events
	Number of ARC occurrences per 10,000 aircraft movements	Heavy Landings
	Number of GNSS interference occurrences per 10,000 aircraft movements	GNSS Jamming and Spoofing Global Positioning System (GPS) interference
To achieve a reduction in the number of serious incidents in commercial operations by Malaysian AOC Holders	Number of ground safety occurrences per 10,000 aircraft movements	Aircraft collisions on the ramp Aircraft damage by ground vehicles
	Number of bird strikes per 10,000 aircraft movements	
	Number of air turbulence occurrence reports per 10,000 aircraft movements	Wake turbulence events Mid air turbulence events
For Malaysia to achieve an effective implementation score of at least 90% by 2028	Average EI score based on self-assessment EI Score by audit area EI score by Critical element	
To achieve a reduction in runway safety occurrences by 2028 occurring in Malaysia	Number of safety reports with the potential for a runway excursion event per 10,000 movements	Unstabilised approaches Landings off the runway centreline Glideslope warning events Contaminated runway reports
	Number of unstabilised approaches that continue to land per 10,000 movements	
	Number of missed approaches due to adverse weather per 10,000 aircraft movements	Missed approaches / go arounds from: Windshear Thunderstorm Runway visibility
	Number of runway incursions by aircraft per 10,000 movements	
	Number of runway incursions by vehicles per 10,000 movements	

To achieve an increase in proactive and reactive safety reporting across Malaysian aviation organisations	Number of MORs per 10,000 movements Number of VORs per 10,000 movements Number of occurrence reports as a result of human error per 10,000 movements	
To achieve an improvement in safety culture across Malaysian aviation activities through the strengthening of Just Culture	50% of CAAM CSI's and Managers trained on Just Culture 50% of Organisations that have fully implemented a Just Culture Results of CAAM safety Culture Survey	



Appendix C

Note: These High-Risk Categories (including the Global High-Risk Categories) below are based on the data collected and analysed by the CAAM SSP through CAReS.

No.	Five High-Risk Categories + Global Risk Categories	Number of Accidents			Number of Serious Incidents		
		2023	2024	2025	2023	2024	2025
1	Controlled Flight Into Terrain (CFIT)	0	0	0	0	0	0
2	Loss of Control In-Flight (LOC-I)	0	1	1	0	0	1
3	Mid-Air Collision (MAC)	0	0	0	2	1	3
4	Runway Excursion (RE)	0	0	0	0	0	0
5	Runway Incursion (RI)	0	0	0	0	1	0
6	Abnormal Runway Contact (ARC)	0	0	2	0	2	2
7	System/Component Failure or Malfunction (non-powerplant) (SCF-NP)	0	0	0	3	2	2
8	Turbulence Encounter (TURB)	0	0	0	0	0	0

Note: The Aviation Occurrence Statistics below are based on the data collected by the Air Accident Investigation Bureau (AAIB), including total occurrences and number of fatalities.

Year	Accident	Serious Incidents	Incident	Total Occurrences	Fatality
2021	2	2	1	5	0
2022	4	5	0	9	2
2023	2	5	0	7	10
2024	2	8	0	10	2
2025	5	8	0	13	1
Total	15	28	1	44	15

Note: summary of accidents and serious incidents involving commercial Malaysian-registered and foreign-registered aircraft operating within Malaysian airspace and aerodromes during the reporting period 2023-2025. The purpose of this section is to present a concise overview of significant safety occurrences that required investigation precautionary action, or operational intervention.

Accidents

S/N.	Date	Narrative
1.	10 July 2025	A Malaysia-registered Airbus AS355N helicopter (9M-PHG) operated by Royal Malaysia Police (PDRM) crashed into the water near Sungai Pulai, Johor. All five personnel on board sustained injuries and were rescued by marine police.
2.	13 February 2024	A Foreign-registered Gabriel BK160 operating as Adventure 429 departed Subang Airport for a local flight with two persons onboard. At approximately 0557 UTC, emergency services reported that the aircraft had crashed in the Kapar area after loss of control in-flight.

Serious Incidents

S/N.	Date	Narrative
1.	14 December 2024	A Malaysia-registered Boeing 767-200 (9M-RXE) experienced a flap limit exceedance and altitude deviation during departure from Nanning. The flight continued to Kuala Lumpur for a safe landing.
2.	3 Spetember 2025	A Malaysia-registered Boeing 767-200 experienced a rapid cabin altitude increase while cruising, prompting an emergency descent and safe diversion to Nanning. No injuries were reported.
3.	18 November 2025	A Malaysia-registered Piper PA-28-181 (9M-SKR) experienced a main landing gear detachment
4.	13 November 2025	Two Airbus A320 aircraft (CEB409 and AXM5196) reported TCAS Resolution Advisories during ATC sector operations. Both aircraft responded to the alerts and maintained safe separation.
5.	3 September 2025	A Malaysia-registered Leonardo AW189 helicopter experienced an abnormal Main Gearbox (MGB) oil temperature increase and warning light in cruise, prompting a safe diversion to Suai.
6.	19 August 2025	A Malaysia-registered Pilatus PC-6 (M50-24) experienced a gear-up belly landing on Runway 22 at Alor Setar and skidded onto the grass. No injuries were reported.
7.	4 August 2025	A Foreign-registered Gulfstream V (N5430G) unauthorizedly climbed into conflict with an inbound Malaysia-registered Airbus A330-300 (MAS53), triggering a TCAS Resolution Advisory. Safe separation was maintained.
8.	3 September 2025	A Malaysia-registered Leonardo AW189 helicopter experienced an abnormal Main Gearbox (MGB) oil temperature increase and warning light in cruise, prompting a safe diversion to Suai.
9.	14 December 2024	Malaysia-registered Airbus A320 and Foreign-registered Airbus A321 received TCAS Resolution Advisories after separation was reduced to less than 5 NM during combined ATC sector operations. Both aircraft responded to the TCAS alerts and maintained safe separation.
10.	6 September 2024	A Malaysian-registered AgustaWestland AW189 experienced multiple system failure indications in flight. The crew followed procedures and landed safely without further incident.
11.	4 May 2024	A Malaysia-registered Piper PA-28-181 sustained a propeller strike during a hard landing by a student pilot on a solo flight. The aircraft nosed down upon touchdown, resulting in propeller contact with the runway. No injuries were reported, and the aircraft was safely towed to the hangar and declared aircraft on ground (AOG).
12.	30 January 2024	A Malaysian-registered Diamond DA40 experienced a hard landing at Ipoh (WMKI) during final approach, resulting in a propeller strike. The pilot initiated a go-around and landed safely on the second attempt. Post-flight inspection revealed propeller damage, with no injuries reported.
13.	10 January 2024	A Malaysian-registered Boeing 737-800 was parked at parking bay and was retracted while the Ground Power Unit (GPU) cable remained connected. The tensioned cable caused damage to the aircraft's nose gear door hinge.
14.	3 January 2024	A Malaysia-registered Boeing 737-800 experienced a cabin altitude warning during descent at FL270. The crew conducted a precautionary descent and landed safely.
15.	23 December 2023	A Malaysia-registered A333 had engine No.1 stall in flight and diverted safely with no injuries.
16.	28 July 2023	A Malaysia-registered DHC-6 indicated a near-miss conflict, resolved with no injuries.
17.	19 May 2023	A Malaysia-registered AW139 experienced ground spin during air taxiing with no injuries.
18.	14 May 2023	Left cockpit window detached during flight test, aircraft returned safely with no injuries.
19.	9 May 2023	The Malaysia-registered PA44 and PA28 with a loss of separation but no injuries.

Safer above. Safer beyond.

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